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ABSTRACT

The appendix analyzed evaluation and followup data from the Institute for Movement Therapy whose procedures the Integrated Management of Cerebral Palsy project attempted to replicate. Examined were data from over a 15 year period for 866 patients treated for a broad range of motoric disabilities. Data concerned independence in eating dressing, writing, change of place, speech comprehension and speech production, and manual dexterity in self-care motor tasks. Analyses showed that significant and lasting gains were made in all the areas during the time patients were at the Institute. Followup data showed significant regression only in the areas of eating, dressing and change of place, and significant improvement in writing. Data were presented in table format. (For related information, see also EC 050 502 through EC 050 504.) (Author/GW)

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FINAL REPORT

Volume IV of IV

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EVALUATING AN INTEGRATED APPROACH TO THE MANAGEMENT OF CEREBRAL PALSY

APPENDIX C: AN ANALYSIS OF THE EVALUATION AND FOLLOW-UP DATA FROM THE INSTITUTE FOR MOVEMENT THERAPY IN BUDAPEST, HUNGARY

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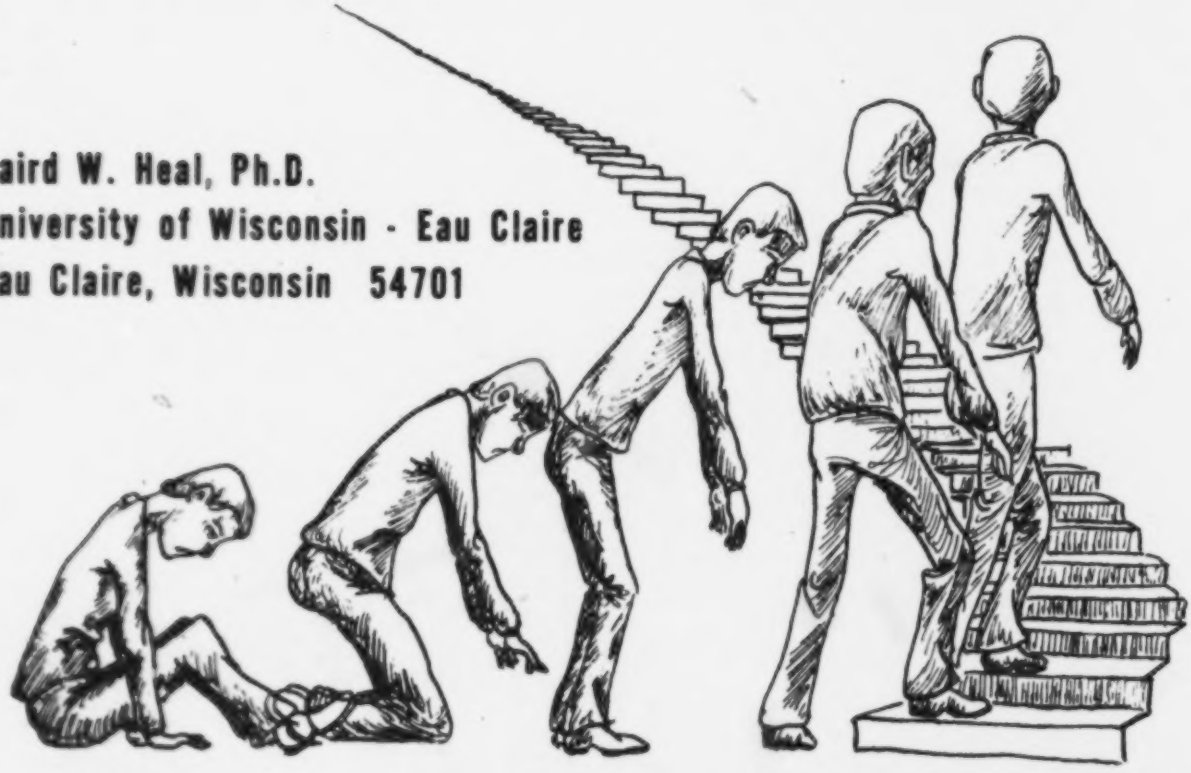

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Final Report

Volume IV of IV

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Evaluating an Integrated Approach to the Management of Cerebral Palsy

Appendix C: An Analysis of the Evaluation and Follow-up Data from the Institute for Movement Therapy in Budapest, Hungary

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August, 1972

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An Analysis of the Evaluation and Follow-up Data from the Institute for Movement Therapy in Budapest, Hungary

The IMCP project was funded to evaluate a program that replicated, as nearly as possible, the procedures used at the Institute for Movement Therapy in Budapest, Hungary. Therefore, it seems to be quite appropriate, indeed obligatory, to report the results of the evaluations that the Institute has published to support the effectiveness of its own program. Hári and Ákos (1971, chapter 1) have presented a comprehensive evaluation of children who have attended the Institute. The present paper presents these data to the English reader for the first time.

The evaluation of the Institute's program was made possible by the systematic assessment of all its students at admission and again at discharge. It is probably not surprising that the Institute's students improved during their period of residence. However, the burden that falls on any habilitative program is to demonstrate that improvements survive after its students have been discharged. In order to conduct a follow-up evaluation, the Institute recalled, in 1968, all of its discharged students, except those with infantile paralysis, who had been at the Institute for one month or more and who had been discharged between 1950 and 1965. Of the 1,002 persons who satisfied these recall criteria, only 866 were located and re-evaluated. The diagnoses of these are shown in Table 1.

Evaluation Results

While Table 1 provides diagnostic labels, it provides little information relating to the level of functioning of the patients before, during or after their sojourn at the Institute. The remainder of this paper is concerned with this latter type of information. First, in very general terms, the patients' level of independence was assessed at the three points in time just mentioned. Table 2 shows the results of this assessment in the form that it was presented by Hári and Ákos.

It is clear that even with these global criteria, the Institute children made and maintained sizable gains in their general independence. This statement is supported by t-tests for correlated measures shown in Table 3. The scores for these t-tests were the categories of independence shown in Table 2. The category of least independence was arbitrarily assigned a score of zero and unit increments were added for successive levels of independence.

Table 1. Diagnostic Categories of the Follow-up Sample at the Institute for Movement Therapy

	Disorder	Number of Cases	
A.	Central Nervous System Disorders		
	1. Ataxia	28	
	2. Dipegia	219	
	3. Childhood Hemiplegia	137	
	4. Double Hemiplegia	29	
	5. Athetosis	213	
	6. Stroke	79	
	7. Parkinsons Disease	1	
	8. Multiple Sclerosis	1	
	Total		707
B.	Spinal Disorders		
	1. Spastic Paraplegia	42	
	2. Flaccid Paraplegia	36	
	3. Quadriplegia	11	
	4. Spinal Bifida	30	
	Total		119
C.	Peripheral Nerve Disorder		33
D.	Unclassified		7
	Total		866

Table 2. General Extent of Independence

Score	Extent of Independence	Number of Cases		
		Admission Evaluation	Discharge Evaluation	Retest Evaluation
0	Totally dependent	36	5	5
1	Partly dependent and in need of instruction	209	15	26
2	Independent but unable to work or study	510	100	108
3	Able to work and study in home environment	56	224	191
4	Able to work and study outside the home	55	522	536
	Total	866	866	866
	Average Score/Total	.467	.859	.854

Table 3. Families of t-tests for Independence

Comparison	Adm. vs Disch.	Adm. vs Foll.	Disch. vs Foll.
.0	39.567*	37.841*	- .461
.1	41.705*	39.888*	- .485
.2	44.232*	42.306*	- .515
.3	47.282*	45.226*	- .550
.4	51.065*	48.849*	- .594
.5	55.930*	53.509*	- .651
.6	62.517*	59.820*	- .727
.7	72.161*	69.067*	- .839
.8	88.310*	84.571*	- 1.025
.9	124.599*	119.523*	- 1.442
1.0	1294.459*	2335.371*	- 9.854*

* $p < .001$
** $p < .05$
Note: Adm = Admission evaluation
Disch = Discharge evaluation
Foll = Follow-up evaluation

Hári and Akos averaged these numbers, indicating that they regarded successive categories to lie on an interval scale. With three test administrations, three comparisons were possible: admission with dismissal, admission with follow-up, and dismissal with follow-up. Because the correlations among these scores were unknown, Table 3 presents a column for each comparison. The rows of each column are indexed by the values that the correlation coefficient might take. Assuming a test-retest correlation of .8, the results are clearly significant for the first two comparisons (columns) but not for the third.

The next data to be shown are those that deal with manual dexterity in self-care tasks. Dexterity was judged in nine areas: buttoning, lacing and tying shoes, silverware usage, drinking vessel control, comb and brush usage, tooth brushing, watch winding, door and window manipulation, and key and coin manipulation. In each task, the subject was credited with half a point for passing performance with each hand. Thus, the minimum score for all tasks combined was zero and the maximum was nine. The distributions for the admission, discharge and follow-up evaluations are shown in Table 4. The t-tests making the three pair-wise comparisons are shown in Table 5. Again, there is one column for each comparison and one row for each selected correlation. Again, assuming a test-retest correlation of .8 it is probably safe to conclude that significant hand-skill gains were made and maintained with little regression after discharge.

The next facets of evaluation deal with six fundamental competencies: eating, dressing, writing, change of place, speech comprehension and speech production. These activities are presented in Tables 6-17 in the same format as that of Tables 2 and 3. As with Table 2, each of the tables of descriptive data is associated with a table of t and two-tailed p values.

The pattern of results shown in these tables is extremely consistent. Significant and lasting gains were registered in all of the areas measured regardless of the correlations between successive tests. The results of the Discharge-Retest comparisons were more complex. Assuming a test-retest reliability of .8, three of the eight assessment areas tabled in Tables 2-17 showed regression during the period from discharge to retest. These three were eating (Tables 6 and 7, $t = -2.204$, $p = .026$), dressing (Tables 8 and 9, $t = 1.984$, $p = .045$), and change of place (Tables 12 and 13, $t = -2.367$, $p = .017$). One

Table 4. Manual Dexterity in Self-care Tasks

Score	Admission Evaluation	Discharge Evaluation	Follow-up Evaluation
0	31	3	7
1	17	3	4
2	32	7	6
3	32	3	6
4	67	12	11
5	141	12	18
6	172	28	22
7	193	77	72
8	66	145	124
9	115	576	596
Total	866	866	866
Average Score/ total	.654	.922	.919

Table 5. T-tests for Manual Dexterity in Self-care Tasks

Comparison	Adm. vs Disch.	Adm. vs Foll.	Disch. vs Foll.
.0	27.215*	26.046*	- .411
.1	28.528*	27.360*	- .433
.2	30.051*	28.894*	- .459
.3	31.847*	30.720*	- .491
.4	34.010*	32.942*	- .530
.5	36.682*	35.729*	- .580
.6	40.104*	39.369*	- .647
.7	44.705*	44.409*	- .746
.8	51.368*	52.063*	- .909
.9	62.309*	65.826*	-1.269
1.0	85.693*	103.893*	-5.542*

* $p < .001$
** $p < .05$

Note: Adm = Admission evaluation
Disch = Discharge evaluation
Foll = Follow-up evaluation

Table 6. Eating Competence

Score	Extent of Independence	Number of Cases		
		Admission Evaluation	Discharge Evaluation	Retest Evaluation
0	Chewing & swallowing difficult or impossible	4	0	0
1	Passive feeding and drinking	56	7	9
2	Brings eating utensils to mouth but requires assistance to complete a meal	67	16	20
3	Eats & drinks alone with some help(e.g. cutting meat, bones out of fish)	219	26	30
4.	Eats alone with fork, knife and spoon	520	817	807
Total		866	866	866
Average Scores/Total		.845	.977	.972

Table 7. T-tests for Eating Competence

Comparison	Adm. vs Disch.	Adm. vs Foll.	Disch vs Foll.
.0	15.538*	14.641*	- .996
.1	16.154*	15.264*	-1.050
.2	16.849*	15.973*	-1.113
.3	17.643*	16.792*	-1.190
.4	18.560*	17.752*	-1.284
.5	19.637*	18.897*	-1.405
.6	20.926*	20.297*	-1.569
.7	22.508*	22.063*	-1.808
.8	24.513*	24.388*	-2.204**
.9	27.171*	27.647*	-3.075*
1.0	30.937*	32.698*	-13.356*

* $p < .001$
** $p < .05$

Note: Adm = Admission evaluation
Disch = Discharge evaluation
Foll = Follow-up evaluation

Table 8. Dressing and Undressing

Score	Extent of Independence	Number of Cases		
		Admission Evaluation	Discharge Evaluation	Retest Evaluation
0	Totally passive	47	6	7
1	Participates actively in dressing	92	6	4
2	Dresses self but requires much help	157	16	26
3	Dresses self but requires some help with buttoning, tying shoes, etc.	460	118	122
4	Dressing alone	110	720	707
Total		866	866	866
Average Score/Total		.643	.945	.938

Table 9. T-tests for Dressing and Undressing

Comparison	Adm. vs Disch.	Adm. vs Foll.	Disch. vs Foll.
.0	30.335*	29.308*	- .890
.1	31.727*	30.691*	- .938
.2	33.331*	32.290*	- .995
.3	35.206*	34.169*	-1.063
.4	37.437*	36.419*	-1.148
.5	40.155*	39.181*	-1.258
.6	43.566*	42.685*	-1.406
.7	48.026*	47.335*	-1.622
.8	54.213*	53.936*	-1.984**
.9	63.636*	64.389*	-2.797**
1.0	80.680*	84.928*	-24.240*

* $p < .001$
** $p < .05$

Note: Adm = Admission evaluation
Disch = Discharge evaluation
Foll = Follow-up evaluation

Table 10. Writing and Drawing

Score	Extent of Independence	Number of Cases		
		Admission Evaluation	Discharge Evaluation	Recall Evaluation
0	Cannot hold pencil	183	32	33
1	Holds pencil but can't target and write	81	7	8
2	Draws a line between two dots	42	21	13
3	Draws straight and curved lines	230	289	121
4	Writes if paper has lines as guides	3	26	16
5	Writing is legible but unattractive	139	243	371
6	Writing and drawing normal	188	248	304
Total		866	866	866
Average Score/Total		.518	.717	.797

Table 11. T-tests for Writing and Drawing

Comparison	Adm. vs Disch.	Adm. vs Foll.	Disch. vs Foll.
.0	12.946*	18.575*	6.641*
.1	13.602*	19.491*	7.000*
.2	14.369*	20.557*	7.423*
.3	15.282*	21.819*	7.934*
.4	16.395*	23.346*	8.567*
.5	17.792*	25.247*	9.381*
.6	19.622*	27.704*	10.482*
.7	22.164*	31.053*	12.091*
.8	26.046*	36.011*	14.779*
.9	33.105*	44.490*	20.778*
1.0	53.387*	64.640*	135.284*

* $p < .001$
** $p < .05$

Note: Adm = Admission evaluation
Disch = Discharge evaluation
Foll = Follow-up evaluation

Table 12. Change of Place

Score	Extent of Independence	Number of Cases		
		Admission Evaluation	Discharge Evaluation	Recall Evaluation
0	Cannot walk, can only crawl and turn over prone-supine	51	1	6
1	Can sit in chair with facilitation (furniture)	45	1	5
2	Sits better than #2, but cannot stand	24	4	9
3	Sits in chair alone, cut cannot stand	57	1	11
4	Can move from one chair to another but cannot stand up	16	3	3
5	Can stand up from chair with help	203	135	155
6	Can stand for 1 minute without facilitation	20	12	9
7	Can stand up from floor without facilitation	1	1	1
8	Can stand up from floor without facilitation and can take 1 or 2 steps	36	54	42
9	Moves from room to room but cannot do stairs	29	11	7
10	Can walk but gait not steady or even - needs guide rail to take stairs	220	7	12
11	Inside house walks well but tires easily	41	22	8
12	Can walk in house and garden but cannot walk well on the street in crowd	31	29	15

Table 12 Continued

13	Walk in street with companion, doesn't go too far	39	56	46
14	Can walk on street alone, but needs help to get on public transportation (bus, streetcar, train)	13	93	74
15	Walks very well on street, uses public transportation alone	3	58	39
16	Can walk long distance well but walk still shows disfunction (neurological)	14	329	356
17	Normal appearance	2	49	68
Total		866	866	866
Average Score/Total		.434	.745	.731

Table 13. T-tests for Change of Place

Comparison	Adm. vs Disch.	Adm. vs Foll.	Disch vs Foll.
.0	25.643*	23.078*	-1.072
.1	27.030*	24.317*	-1.129
.2	28.670*	25.778*	-1.197
.3	30.649*	27.539*	-1.279
.4	33.104*	29.719*	-1.381
.5	36.264*	32.515*	-1.511
.6	40.543*	36.284*	-1.686
.7	46.814*	41.767*	-1.942**
.8	57.332*	50.839*	-2.367**
.9	81.066*	70.609*	-3.297**
1.0	3120.072*	264.915*	-13.570*

* $p < .001$
** $p < .05$

Note: Adm = Admission evaluation
Disch = Discharge evaluation
Foll = Follow-up evaluation

Table 14. Aural Understanding - Comprehension of Directions

Score	Competence	Number of Cases		
		Upon Admission	Upon Discharge	Upon Recall
0	Doesn't understand anything	2	0	0
1	Understands some words	21	13	13
2	Understands simple cause and effect relationships	18	11	11
3	Understands logical abstractions but needs a lot of explanation	160	131	123
4	Understands normally for his age	665	711	719
Total		866	866	866
Average Score/Total		.923	.945	.947

Table 15. T-tests for Aural Understanding - Comprehension of Directions

Comparison	Adm. vs Disch.	Adm. vs Foll.	Disch. vs Foll.
.0	3.010*	3.343*	.360
.1	3.169*	3.520*	.379
.2	3.357*	3.728*	.402
.3	3.583*	3.978*	.430
.4	3.861*	4.286*	.464
.5	4.216*	4.679*	.509
.6	4.692*	5.205*	.569
.7	5.376*	5.959*	.657
.8	6.485*	7.179*	.804
.9	8.786*	9.692*	1.137
1.0	21.666*	23.019*	55.538*

* $p < .001$
** $p < .05$

Note: Adm = Admission evaluation
Disch = Discharge evaluation
Foll = Follow-up evaluation

Table 16. Speech Clarity

Score	Competence	Number of Cases		
		Admission Evaluation	Discharge Evaluation	Recall Evaluation
0	Doesn't speak at all	31	14	13
1	Speaks - not understandable	9	3	3
2	Difficult to understand	79	19	20
3	Speaks but makes pronunciation errors	59	59	52
4	Speaks but rhythm incorrect. Doesn't emphasize words correctly	153	188	182
5	Speaks normally	535	583	596
Total		866	866	866
Average Score/Total		.839	.897	.902

Table 17. T-tests for Speech Clarity

Comparison	Adm. vs Disch.	Adm. vs Foll.	Disch. vs Foll.
.0	5.389*	5.893*	.568
.1	5.665*	6.193*	.598
.2	5.988*	6.543*	.635
.3	6.373*	6.961*	.678
.4	6.845*	7.471*	.733
.5	7.439*	8.112*	.803
.6	8.220*	8.953*	.897
.7	9.314*	10.125*	1.036
.8	11.007*	11.924*	1.269
.9	14.168*	15.228*	1.793
1.0	24.188*	25.064*	43.097**

* $p < .001$
** $p < .05$ Note: Adm = Admission evaluation
Disch = Discharge evaluation
Foll = Follow-up evaluation

measure, writing (Tables 10 and 11, $t = 14.779$, $p < .001$) showed significant improvement after discharge. While not significant, manual dexterity showed a regression similar to that of eating, dressing, and change of place; and comprehension and speech were associated with nonsignificant gains. This pattern of results suggests that there was moderate decline in self-help skills and a moderate increase in academic skills after discharge from the Institute.

Interpretive Cautions

While the data just presented are impressive in the consistency of their support of the effectiveness of the program of the Institute for Movement Therapy, their interpretation is subject to several points of caution.

First, the data were gathered by the same people who were responsible for the intervention and whose livelihood depended upon its success. The only defensible approach to gathering evaluation data is to employ evaluators who are uninformed as to their real purpose.

Second, the operations associated with the levels of independence and competence are not completely clear to the reader. The use of observable behaviors to index levels of functioning is probably not to be questioned here. However, the initial paraphrasing and subsequent translation leave the reader three steps removed from the original behaviors.

Third, the scale of the data was assumed to be interval, although it could be argued that it should have been ordinal or perhaps even nominal. Inferential statistics were calculated using the interval assumption because (a) Hári and Akos made that assumption (reporting averages for each column of each table) and (b) because that assumption permitted a primitive control for the test-retest correlations.

Degree of Independence by Disability Groups

Table 18 shows the degree of independence at admission and at discharge for each of the major disability groups. Sizable gains were made by all groups. It does not appear that the gains made by any one group were significantly greater than those made by the others. However, it is clear that some groups had greater independence at admission than others.

Table 18. Degree of Independence by Disability Groups

Diagnosis	Average Score/Total Admission Evaluation	Average Score/Total Discharge Evaluation
Ataxia	48.2%	82.1%
Parkinsons Disease	25.0%	50.0%
Childhood Hemiplegia	48.3%	86.9%
Double Hemiplegia	26.7%	62.1%
Spastic Paraplegia	42.3%	94.0%
Flaccid Paraplegia	35.4%	91.7%
Quadriplegia	34.1%	95.5%
Dipegia	48.3%	86.8%
Athetosis	47.1%	83.7%
Spinal Bifida	51.7%	85.8%
Multiple Sclerosis	50.0%	75.0%
Peripheral Nerve Disorder	56.8%	94.7%

Summary and Conclusion

Over a 15-year period, the Institute for Movement Therapy evaluated 866 patients treated from a broad range of motoric disabilities. Evaluation was based on independence in eating, dressing, writing, change of place, speech comprehension and speech production, as well as manual dexterity in self-care motor tasks. Statistical analyses showed that significant and lasting gains were made in all of these areas during the time the patients were at the Institute. During the period from discharge to follow-up testing, only three areas--eating, dressing, and change of place--showed significant regression, while writing showed a significant improvement. These results, as well as the pattern of those that were not statistically significant, suggested that there is a decline in self-help skills and a moderate increase in academic skills after discharge from the Institute.

Reference

Hári, Mária & Ákos, Károlz. Konduktív Pedagogia. Budapest, Hungary: Tankönyvkiadó. 1971